A CASE-study in Modern Icelandic*

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1. Introduction

The study of the paradigm, which was originally viewed as a mere list of inflectionally related forms, and which figured so prominently in traditional grammars, was more or less abandoned with the advent of structural linguistics in America. Theoretical work on paradigms continued to languish until very recently, but several linguists have now reopened the issue of the theoretical significance of paradigms and have laid the foundations for a new understanding of paradigms as something more than mere lists. Whether by accident or design, much of the recent work on paradigms has had a primarily Teutonic data-base, with a great deal of the work focussing on modern German and Icelandic.

In this paper I will be drawing particularly heavily on work by Wurzel and Zwicky. In particular, I want to take another look at cases in Icelandic, as discussed by Wurzel (1987), hereafter W, and Carstairs (1988), hereafter C. The observations made by these two authors are particularly interesting when seen in the light of a Zwicky-style analysis of the same data. Of crucial importance here is the question of which generalizations about paradigms ought to be represented in the grammar, and also how these generalizations are to be understood.

2. The facts

A brief recounting of the facts and the analysis given them by W (as well as amendments made by C) is in order here. Following W and C, I will consider only the very restricted sub-class of strong, feminine, monosyllabic nouns. Kress (1963), hereafter K, lists the following paradigm types for strong feminine, monosyllabic nouns (the numbers in the following table refer to the relevant sections in K):

Table 1: Strong, feminine, monosyllabic noun paradigms

	(1) i-class nouns$_1$ (cf. 157)	(2) i-class nouns$_2$ (cf. 158)
SG NOM	mynd	öxl
ACC	mynd	öxl
DAT	mynd	öxl
GEN	mynd-ar	axl-ar
PL NOM	mynd-ir	axl-ir
ACC	mynd-ir	axl-ir
DAT	mynd-um	öxl-um
GEN	mynd-a	axl-a

	(3) 'pure' a-class nouns (cf. 140)	(4) 'pure' a-class nouns with á (cf. 142)
SG NOM	vél	á
ACC	vél	á
DAT	vél	á
GEN	vél-ar	á-r
PL NOM	vél-ar	á-r
ACC	vél-ar	á-r
DAT	vél-um	á-m
GEN	vél-a	á-a

	(5) va-class nouns (cf. 143)	(6) ja-class nouns (cf. 144)
SG NOM	stödh	skel
ACC	stödh	skel
DAT	stödh	skel
GEN	stödhv-ar	skelj-ar
PL NOM	stödhv-ar	skelj-ar
ACC	stödhv-ar	skelj-ar
DAT	stödhv-um	skelj-um
GEN	stödhv-a	skelj-a

	(7) C-stem nouns$_5$ (cf. 168)	(8) C-stem nouns$_6$ (cf.170)
SG NOM	nögl	brú
ACC	nögl	brú
DAT	nögl	brú
GEN	nagl-ar	brú-ar
PL NOM	negl-ur	brý-r
ACC	negl-ur	brý-r
DAT	nögl-um	brú-m
GEN	nagl-a	brú-a

	(9) C-stem nouns$_7$ (172)	(10) C-stem nouns$_8$ (173)
SG NOM	geit	mús
ACC	geit	mús
DAT	geit	mús
GEN	geit-ar	mús-ar
PL NOM	geit-ur	mýs
ACC	geit-ur	mýs
DAT	geit-um	mús-um
GEN	geit-a	mús-a

	(11) C-stem nouns$_2$ (cf. 168)	(12) C-stem nouns$_3$ (cf. 168)
SG NOM	nótt	mörk
ACC	nótt	mörk
DAT	nótt	mörk
GEN	nætt-ur	merk-ur
PL NOM	nætt-ur	merk-ur
ACC	nætt-ur	merk-ur
DAT	nótt-um	mörk-um
GEN	nótt-a	merk-a

	(13) C-stem nouns$_4$ (cf. 169)	(14) C-stem nouns$_1$ (cf. 167)
SG NOM	vík	ký-r
ACC	vík	kú
DAT	vík	kú
GEN	vík-ur	ký-r
PL NOM	vík-ur	ký-r
ACC	vík-ur	ký-r
DAT	vík-um	kú-m
GEN	vík-a	kú-a

The <dh> in type (3) is an [ð]. The <æ> in type (11) represents a long diphthong [a^{i}:]. Accented vowels are long. Otherwise the orthography corresponds fairly closely to standard transcription symbols.

3. W's analysis

W analyzes four declension classes covering these various paradigms according to the following schema (from C):

Table 2: Monosyllabic feminine nouns

	Type A:	Type B:	Type C:	Type D:
SG NOM	ϕ	ϕ	ϕ	ϕ
GEN	-ar	-ar	-ar	-(u)r
DAT, ACC	ϕ	ϕ	ϕ	ϕ
PL NOM, ACC	-ir	-ar	-(u)r	-(u)r
GEN	-a	-a	-a	-a
DAT	-um	-um	-um	-um

Obviously, a considerable amount of analysis has been done to yield this tidy package. W simply gives this analysis without defending it; but I will reconstruct the apparent arguments behind this analysis, because much of the point I will be making later depends on an understanding of the full range of paradigm types present in these data. It will also become apparent in so doing that this implicit analysis cannot be completely correct. The phonological framework I will be using is Natural Phonology (NP).

The first thing that should be noticed about W's analysis is that it breaks down the declension classes strictly on the basis of the relevant affixes, and not on the basis of the various non-affixal marks of inflection (most notably, vowel shifts). This has the effect of collapsing seemingly distinct paradigm types into the same declension class in Wurzel's analysis. For example, types (1) and (2), which are identical with respect to their endings, but apparently different in regard to internal change, are counted as members of a single declensional class, namely type A in Table 2.

A number of the paradigms which appear superficially different from each other are actually phonological and morphonological variants of one another. Types (5) and (6), which show stem variants, are readily amenable to an automatic phonological analysis whereby word-final clusters whose second members are glides are reduced by the deletion of the glide:

(1) C[+glide] --> ϕ/C ___ (C, #)

Type (4) resembles type (3) considerably; the only difference is that in paradigm (4) all of the endings of shape VC have lost their vowels. This deletion is best analyzed as arising from a morphonological rule since there are parallel instances in certain other lexically-marked morphemes in the language where such a deletion does not occur, e.g. strá-um (see sec. 134 of K). These facts are instead described by a morphonological rule, something like:

(2) V --> ϕ/ V́ + ___

I suspect this rule is weakening via a diffusionary path through the lexicon at the present time; certainly there are exceptions to it in some forms. The vowel /a/, in particular, seems to be immune to this rule -- a fact which we would want to capture in a careful formulation of this rule. Paradigm (10) is like paradigms (7) through (9) with the exception of the NOM and ACC PL, where there is no overt ending present. At this stage of the analysis it seems plausible to argue that the NOM and ACC PL ending in paradigm (10) is simply /-r/ (cf. paradigm 8) and that this /r/ is deleted by an independently needed automatic phonological rule which deletes /r/ between /s/ and a word boundary:

(3) r --> ϕ/s ___ #

This analysis is shown to be wrong in section 3.1, however, where it is demonstrated that the underlying form of the ending is actually /-ur/. This means that the resulting surface form should be /mýs-ur/, given our current set of rules. This is quite obviously not the case, so we are forced either to state the NOM and ACC PL forms of type C s-stem nouns (in Table 2) as lexical exceptions or to have a morphonological rule deleting /u/ after s-stem nouns. The second of these solutions is more general and the one which will be adopted here.

(4) u --> ϕ/s + ___

Since (4) is a morphonological rule it precedes and feeds rule (3), which is an automatic phonological rule; this order yields the correct surface form mýs from underlying /mýs-ur/.

3.1 A problem with W's analysis

In the consonant stem nouns, we notice variation between /-r/ and /-ur/ in the NOM and ACC PL. This is one case where it would be very nice to have some explicit discussion of the phonological, morphonological, and morphological assumptions under which W is working. But regardless of the assumptions made, W's analysis cannot be correct.

To see that this is true we must consider a rather involved account of the so-called 'young u' in Modern Icelandic, which is found in the /-ur/ variant of the ending mentioned in the previous paragraph. K remains noncommittal on the synchronic status of the 'young u', stating only the diachronically-oriented fact that, 'Einem *r* mu*ß* ein Vokal entweder folgen oder vorausgehen. Wo dies im Altisländischen nicht der Fall war, wurde später vor das *r* ein *u* eingeschoben (junges *u*).' (K p.52)[1]

If the 'young u' is inserted by an automatic phonological rule in synchronic Modern Icelandic, however, there arise some unhappy consequences. It is indisputable that in the automatic phonology of synchronic Modern Icelandic, word-final /r/ is completely assimilated to a preceding /n/ or /l/ (and is further deleted if a consonant precedes the /n/ or /l/), and is deleted after /r/ and /s/ (cf. K pp. 57-8). This leads to a contradiction, though, as can be seen in a paradigm like (7). Given both a u-insertion rule and the rules mentioned in the previous sentence, the actually occurring NOM PL negl-ur is predicted to be *either* /negl/ (if the r-deletion applies first) *or* /negl-ur/ (if the u-insertion applies first). Since both the r-deletion and the u-insertion rule would be automatic phonological rules, however, we do not want to be forced to stipulate an ordering between them. Therefore the hypothesis that 'young u' is inserted is untenable. The only other possibility if we wish to maintain a (mor)phonological account of these facts, then, is to have a u-deletion rule. But we already have a rule deleting short vowels when they occur between a long vowel and a morpheme boundary (see rule (2) above). The obvious solution is the simple one, namely that 'young u' is present in the basic form of the morpheme and is deleted by rule (2).

Now, why is this a problem for W? To answer this we must step back and consider paradigms (11) through (14). These paradigms are morphologically identical, with two exceptions. The /-r/~/-ur/ alternation in the NOM and ACC PL is completely covered by the rule just discussed. There are two other differences, however. First, paradigm (11) has a /tt/~/t/ alternation, a problem which we will return to, but which is not immediately relevant in this argument. The second and real problem here is the NOM SG form of paradigm (14), which has an ending /-r/.

I have credited W with treating this paradigm type as having lexically-marked exceptions in their NOM SG forms. Working backwards, one must assume that W saw this paradigm type as not a type at all, but rather a set of a few lexical exceptions to his type D declension class.

K gives only three members of this class, and we might find W justified in this assumption if it were not for an interesting complementarity in the data. There are no nouns acting like (11), (12) and (13) which end in a long vowel, whereas all the nouns which act like (14) have a stem-final long vowel. This strongly suggests that a phonologically based solution is needed.

The question is, what might that solution be? If we posit an underlying /-ur/ in the NOM SG of this declension class, there is no way to account for the lack of ending in types (11), (12) and (13). If, however, we posit an underlying ending /-r/ in the NOM SG of declension type D, a ready solution exists. Icelandic makes considerable use of the distinction 'light' vs. 'heavy' syllable. 'Heavy' syllables are those which have either a long vowel nucleus with a single consonant offset, or a short vowel nucleus with a consonant cluster offset. All other syllables are 'light'. A careful check of the data reveals that all nouns behaving like (11), (12) and (13) have roots with 'heavy' syllables. On the other hand, all nouns behaving like (14) have long vowels which have no offset (as mentioned earlier) and therefore count as 'light' syllables in Icelandic phonology.

The correct solution in this case seems to be that the ending for the NOM SG of the type D declension is /-r/ in all instances. This /-r/ appears, however, only in instances where it follows 'light' roots; otherwise it is not present. I will state this as a restriction on a realization rule as follows:

(5) /-r/ is not morphonologically realized when it would occur between 'heavy' syllables and word boundaries.

This conclusion is considerably different from the implicit analysis presupposed by W. It requires a different analysis for NOM SG <kýr>, which derives in my analysis from an underlying /kýˑ-r/; and e.g. NOM PL <kýr>, which derives in my analysis from an underlying /kýˑ-ur/ via deletion of the /u/ by rule (2). There seems to be no other plausible explanation for these facts, however, than that given in the preceding paragraphs. This means that W's treatment of the type D declension, with no ending in the NOM SG, is wrong. This fact does not immediately affect W's paradigm structure conditions (to be discussed later) since they nowhere make mention of the feature bundle [CASE:nom, NUM:sg], or its realization (which is a fault in itself, as I will later show). Despite the fact that W doesn't refer to this particular feature bundle, however, it is fundamentally important to have the correct (mor)phonological analysis before making claims about the morphological analysis of a language.

There is one last bit of variation that we have not yet accounted for in paradigm (11). Here we find two (obviously phonologically related) roots within the paradigm. The vowel shift will be ignored for the moment (following W), while we consider the /tt/~/t/ alternation. There is nothing in the phonology of Icelandic which leads us to expect the simplification of a /tt/ cluster when it occurs in this environment. In fact, we may compare the form nætt-ur with the form hátt-ur (K p. 87), where nearly identical conditions are present but there is no degemination. This most certainly calls for a morpholexical analysis, whereby the particular lexical item has two allomorphs listed in the lexicon with the conditions under which they occur. This variation is simply a non-rule-governed 'glitch' in the linguistic system.

By way of summary thus far, we now have collapsed paradigms (1) and (2) to form a single declension class with respect to their endings; this class corresponds to W's type A. Types (3), (4), (5) and (6) form a single declension class via our first two rules; this class corresponds to W's type B. Taking our second, third and fourth rules into consideration, types (7), (8), (9) and (10) form a single class with respect to their endings, corresponding to W's type C. Types (11), (12), (13) and (14) are identical with respect to their endings if we take our second and fourth rules and the lexeme-specific allomorphy found in (11) into account; this class corresponds to W's type D, but with /-r/ in the NOM SG. A revised version of the table of endings given by C is repeated here with the appropriate amendments:

Table 3: Monosyllabic feminine nouns (revision 1)

	Type A:	Type B:	Type C:	Type D:
SG NOM	∅	∅	∅	-r
GEN	-ar	-ar	-ar	-ur
DAT, ACC	∅	∅	∅	∅
PL NOM, ACC	-ir	-ar	-ur	-ur
GEN	-a	-a	-a	-a
DAT	-um	-um	-um	-um

4. W's Paradigm Structure Conditions (PSCs)

W cooks these data down (implicitly) in much the same way we have here. His reason for doing so is to allow him to make sense of the paradigms in terms of what he calls PSCs. Again following C's presentation of the facts, I give the PSCs which W offers for these paradigms.

Table 4: Wurzel's paradigm structure conditions for Table 2

1. [+Subst] --> [um/DAT PL]
2. [+Subst, (-C, -V́)] --> [a/GEN PL]
3. [+Subst, +Fem, monosyllabic] --> [∅/DAT\ACC SG]
4. [+Subst, +Fem, -C, monosyllabic] --> ([ir/NOM\ACC PL]-->) [ar/GEN SG]
5. [ur/GEN SG] --> [ur/NOM\ACC PL]

NOTE: '(a) --> indicates a "default-implication", that is an implication which holds unless overridden by a lexical feature or a more specific default-implication.' (from C)

W sets up these PSCs as a set of default statements which indicate the inflectional endings associated with the grammatical features they represent on the right sides of the arrows, depending on various lexical properties of the stems on the left sides of the arrows. Among the lexical properties which W takes advantage of are: [+Subst], which embraces nouns, adjectives, pronouns, and determiners; [+Fem] which is simply lexically-marked gender; various features of sound shape, such as the features monosyllabic, -C and -V́, the last two of which refer to the final segment in the stem; and particular inflectional marks, such as [ur/GEN SG].

5. C's constraint on PSCs

While it is not crucial to the main issue presented later in this paper, it is worth noting that C has proposed a constraint on PSCs. C's essential insight is that in any paradigm one or more feature bundles will be realized with more different inflections than the other feature bundles. The Paradigm Economy Principle (PEP) as put forth by C says that the total number of paradigms will not exceed the number of distinct realizations of the most variously realized feature bundle(s). For this reason, any particular paradigm ought to be able to be classified on the basis of its realization of the feature bundle which has the most different realizations. The term given to this particular inflected form is the Kennform, German for 'recognition-form'.

C's proposal depends crucially upon this notion. C proposes that 'No forms other than Kennformen may form the basis for PSCs.' Since the NOM PL or ACC PL is the most diversely realized of the inflections in these paradigms, one or the other or both must serve as Kennforms. This permits a PSC such as (4) in Table 4, where the [ir/NOM\ACC PL]

predicts [ar/GEN SG], since NOM\ACC PL is the Kennform. But it does not allow PSC (5), [ur/GEN SG] --> [ur/NOM\ACC PL], which predicts the Kennform on the basis of a non-Kennform. The PEP is an obvious weakening of the capabilities of PSCs, and it appears to make some correct predictions about language change as discussed in C.

6. Paradigms and realization rules

In this section an alternative approach to the facts in question is considered. Following Zwicky 1985, hereafter Z, I make use of two types of realization rules: rules of exponence and rules of referral. Rules of exponence 'realize some bundle [of grammatical features], in the context of some other bundle [of features], as a morphophonological operation or operations.' (Z p. 373) Rules of referral tell us 'that certain combinations of features have the same realization as certain others.' (Z p. 372) The ultimate goal of this paper is to consider the relationship between Z's realization rules and W's PSCs.

First let us consider what the realization rules might look like which are needed to realize all of the feature bundles represented in the Icelandic noun paradigm. Much of the inflectional marking in Icelandic noun paradigms is done via affixation, specifically with endings. And it is this aspect of inflectional marking which W and C focus on. But this is not the sole mark of inflection in these paradigms. Both so-called u-umlaut and i-umlaut, which historically were automatic phonological processes, have been morphologized in Icelandic and serve as marks of various feature bundles. Perhaps the most dramatic example of the loss of phonetic motivation for umlaut can be seen in instances, such as the NOM SG in paradigms (2), (7) and (12), where the only mark of inflection is u-umlaut (which causes an a --> ö shift). U-umlaut was originally due to a suffix *-u which has since been lost, while leaving its mark on the stem.

In the theory of morphological description espoused by Z, both affixation and the vowel shifts are given in the grammar as morphonological operations which are put to use by realization rules. Hence the realization of the feature bundle [CASE:nom, NUM:sg] in the context of [CAT:noun, CLASS:strong, GEND:fem, (TYPE:a)] is accomplished by shifting the vowel of the stem from /a/ to /ö/. In the same context, but for the feature bundle [CASE:dat, NUM:pl], the realization rule will need to make reference to the u-umlaut operation, *and* the operation of /-um/ suffixation.

In Icelandic, the operation of u-umlaut is defined only on /a/. It is also true that we find a complementarity between stems which show alternation and stems which do not among the DAT and ACC SG forms of the strong feminine nouns. The nouns which do show stem alternation always show the same alternation, /a/~/ö/. Hence, we may make a very general statement that *all* strong feminine nouns have u-umlaut as the operation realizing [CASE:{nom, acc}, NUM: sg]. The fact that the effects of this operation are apparent only in stems which have a basic /a/ follows from the nature of the operation of u-umlaut. This strategy of referring to operations in rules allows maximum generality in the application of rules, with the apparent differences in realization usually being due to restrictions on the morphonological operations referred to by the rules (as shown in the example above). It is even the case that no type A noun ever has an underlying /a/ in its root, and therefore never shows this alternation. This allows us to say that u-umlaut applies to all DAT and ACC SG forms among the strong feminine nouns, but that it always does so vacuously to nouns of type A; we thereby maximize the generality of our realization rule. Many similar instances are readily available. For example, all realizations of [CASE:dat, NUM:pl] on Icelandic nouns include suffixation of /um/. Only some of these nouns, however, show concomitant vowel shifts. Why? A careful look at the data reveals that only those stems which have a basic /a/ show a vowel shift in the DAT PL. Again this follows from the statement of the operation of u-umlaut in the grammar of Icelandic.

Similarly, there is an operation of so-called i-umlaut, which originally had the phonological effect of causing vowels to more closely approximate /i/. But again, this operation is undefined for some vowels and diphthongs, such as /í/ and /ei/, as can be seen in paradigms (9) and (13) in the PL NOM and ACC. The other paradigms of these types show vowel shifts for the specified feature bundles precisely because their stem vowels are in the domain of i-umlaut.

These data also provide nice examples of the other type of realization rule which was mentioned, namely rules of referral. With the exception of type D, the DAT and ACC SG forms in these paradigms are always identical to the NOM SG. Clearly, we do not want to be put in the position of needing to state this fact by the use of three independent and accidentally identical realization rules for the relevant feature bundles in types A, B and C. Instead, of course, we may use rules of referral. These would look something like the following:

(6) Realization Rule x: in the context of [CAT:noun, GEND: fem, CLASS: strong], the bundle [CASE:{acc, dat), NUM:sg] has the same realization as [CASE: nom, NUM:sg].

At this point, we give a yet further amended table of the paradigm types, including not only the endings involved in inflection, but the vowel shift operations as well. In this table 'i-u' refers to the operation 'i-umlaut' and 'u-u' refers to the operation 'u-umlaut'.

Table 5: Monosyllabic feminine nouns (revision 2)

	Type A:	Type B:	Type C:	Type D:
SG NOM	ϕ, u-u	ϕ, u-u	ϕ, u-u	-r, u-u
GEN	-ar	-ar	-ar	-ur, i-u
DAT, ACC	ϕ, u-u	ϕ, u-u	ϕ, u-u	ϕ, u-u
PL NOM, ACC	-ir	-ar	-ur, i-u	-ur, i-u
GEN	-a	-a	-a	-a
DAT	-um, u-u	-um, u-u	-um, u-u	-um, u-u

For these data a complete list of the morphonological operations used to realize the various inflectional features is given in Table 6, and in Table 7 are the realization rules which use these operations. Each operation and rule is given an arbitrary index in these tables.

Table 6: Morphological Operations

OP 12: suffix /-r/

OP 13: suffix /-ar/

OP 14: suffix /-ur/

OP 15: suffix /-ir/

OP 16: suffix /-a/

OP 17: suffix /-um/

OP 18: shift /a/ to /ö/ [traditional u-umlaut]

OP 19: shift /ú, ó, a/ to /ý, æ, e/ respectively [traditional i-umlaut]

Table 7: Realization Rules

RR 40: In the context [CAT:noun], the bundle [CASE:dat, NUM:pl] is realized by OP 17 and OP 18.

RR 41: In the context [CAT:noun], the bundle [CASE:gen, NUM:pl] is realized by OP 16.

RR 42: In the context [CAT:noun, GEN:fem, CLASS:str, TYPE:a], the bundle [CASE:nom, NUM:pl] is realized by OP 15.

RR 43: In the context [CAT:noun, GEN:fem, CLASS:str, TYPE:b], the bundle [CASE:nom, NUM:pl] is realized by OP 13.

RR 44: In the context [CAT:noun, GEN:fem, CLASS:str], the bundle [CASE:nom, NUM:pl] is realized by OP 14 and OP 19.

RR 45: In the context [CAT:noun, GEN:fem, CLASS:str], the bundle [CASE:acc, NUM:pl] has the same realization as [CASE:nom, NUM:pl].

RR 46: In the context [CAT:noun, GEN:fem, CLASS:str, TYPE:d], the bundle [CASE:nom, NUM:sg] is realized by OP 12 and OP 18.

RR 47: In the context [CAT:noun, GEN:fem, CLASS:str], the bundle [CASE:acc, NUM:sg] is realized by OP 18.

RR 48: In the context [CAT:noun, GEN:fem, CLASS:str], the bundle [CASE:{nom, dat}, NUM:sg] has the same realization as [CASE:acc, NUM:sg].

RR 49: In the context [CAT:noun, GEN:fem, CLASS:str, TYPE:d], the bundle [CASE:gen, NUM:sg] is realized by OP 14 and OP 19.

RR 50: In the context [CAT:noun, GEN:fem, CLASS:str], the bundle [CASE:gen, NUM:sg] is realized by OP 13.

A few notes about the interactions and effects of these rules are in order here. There are some examples of more specific rules overriding more general rules in this set of rules. RR 46 realizes the NOM SG of type D nouns by suffixing /-r/ and u-umlauting the root vowel. RR 48 says that the realization of all DAT and NOM SG forms is the same as the realization of their corresponding ACC SG forms. This would predict that type D nouns are realized merely by u-umlaut, not u-umlaut plus suffixing of /-r/. Since RR 46 specifically realizes this form, RR 48, which is more general, is overridden by it. That is to say, RR 48, which yields a realization for any NOM SG form, is overridden by RR 46, which yields a realization for the NOM SG of type D nouns only. Similarly, RR 49, which realizes the feature bundle GEN SG on type D nouns, overrides RR 50, which realizes the feature bundle GEN SG on nouns of all types. Also, RR 44 is overridden by RR 42 and RR 43, both of which specify particular endings for the NOM PL forms of types which do not follow the general rule. These rule interactions follow from the nature of the realization rules themselves as default statements.

There is one further point of interest in these data, again having to do with the NOM SG of type D. Paradigm (14) has as its representative in the NOM SG the form <ký-r>, from an underlying /kú-r/. Our realization rules call for the operations of /-r/ suffixation and u-umlaut in this form, yet seemingly we find /-r/ suffixation and i-umlaut. This is only an apparent problem, however. It is still the case that this form is realized by /-r/ suffixation and u-umlaut, but the operation of u-umlaut is undefined on /ú/, so that no vowel shift takes place. The effect of i-umlaut is not achieved by the realization rule, but rather by a morphonological rule which is well-motivated by other evidence in the language. I will state this rule only for the segment in question to keep the presentation simple, but it actually is considerably more general than this:

(7) /ú/ --> [ý]/ ___ + r

Thus, although the /ú/ remains unchanged by the realization rule, it is changed by the morphonological rule. This affords us an opportunity to point out that the morphonological operations called up by rules may have effects identical to morphonological or perhaps even automatic phonological rules.

7. A comparison of approaches

We are now in a position to compare W's PSCs and Z's realization rules. There are really two issues which I wish to discuss in this section of the paper: (1) the difference in theoretical perspective of the two approaches and (2) the empirical differences between the approaches.

7.1 Theoretical differences

Let us begin by looking at the theoretical differences between these approaches. Z's realization rules are fit into a well-articulated and highly modular theory of grammar. Realization rules in this theory give realization to inflectional marks, and are therefore fed by a syntactic component which supplies the syntactic features that the inflectional marks are expressions of. The realization rules depend on the lexicon as well, since they make reference to lexically-marked features such as gender and declension type -- characteristics which are not determined by rule.

Furthermore, these rules, which make use of morphonological operations, actually feed the morphonological and automatic phonolgical components of the grammar. This can be seen in the example given above. The form kýr derives from basic /kú/, which undergoes /-r/ suffixation and u-umlaut via its realization rule, yielding /kú-r/. This form, in turn, is operated upon by the morphonological rule (6), yielding /ký-r/, which in turn is fed to the automatic phonological component. By ordering these components in our theory of grammar, we seek to avoid making language-particular stipulations about rule ordering. It is also very clearly the case in this theory that inflectional morphology is the mediator between syntax and phonology because it provides phonological substance for the realization of syntactic features.

In contrast to Z's realization rules, it is not entirely clear what the theoretical underpinnings of W's PSCs are. W's PSCs are in some ways similar to realization rules, but they are stated in somewhat different terms. PSCs are not so much conditions on the structures of paradigms as they are conditions on the well-formedness of particular inflectionally-marked forms. This is, of course, how Z understands realization rules as well. Realization rules are essentially passive conditions of association between basic and inflectionally-marked forms -- the 'active' sounding vocabulary, e.g. 'suffix /-ur/', is simply a metaphor for understanding the relationship between two sets of forms, one set with /-ur/ and the other without. In the same way PSCs tell us, e.g., that any substantive must end in /-um/ in its DAT PL form if it is to be considered well-formed. This is logically equivalent to our RR 40, the difference in the statement of the rules being merely a difference in formalization. There are some differences in implementation between these approaches, however. C gives an illustrative presentation of the implicit assumption of lexical 'features' present in W's PSCs, which I replicate in Table 8.

Table 8: PSCs & Lexical 'Features'

	Lexical 'feature'	PSC(s) applicable (besides (A-C))
Type A	None	(4) complete
Type B	[ar/N.A.Pl.]	(4) except parenthesized portion
Type C	[ur/N.A.Pl.]	(4) except parenthesized portion
Type D	[ur/G.Sg.]	(5)

I have put the word 'feature' in quotation marks above to show that it is not really a grammatical feature in the normal sense, but rather a simple lexically-specified inflectional form. The lexical entries for roots of types B, C and D in W's account have not only their basic forms, but a particular inflectional form as well. While the analysis I gave made reference to declension types which were then referenced in the realization rules, this is not a necessity of my analysis in this instance and the facts could just as well be handled by lexically-specified inflectional forms.

The question of the 'cost' of theoretical descriptions which arises here is an important one. We are a bit in the situation of comparing apples and oranges here, in trying to determine which analysis is cheaper. At a very simplistic level, W's account requires lexical marking of a special inflectionally-marked form for three of the declension types. It also lists five PSCs which are of greater or lesser complexity. My analysis using realization rules requires either ten realization rules, or seven realization rules plus lexically determined inflectional forms for the ACC PL in three of the paradigms. This may seem like a more expensive account since more rule-like entities are required and they generally seem to require reference to a greater number of pieces of information.

Part of my answer to this charge is to point out that W's PSCs do not provide an account for any NOM SG forms, presumably because he believed them to be the basic forms. This is most certainly wrong. On W's analysis, which takes only inflectional endings into account and which claims that no NOM SG form takes any ending, it is less obvious that it is wrong; but when we take into consideration that the type D declension actually has an /-r/ suffix in the NOM SG, and that all of the declension types under scrutiny show u-umlaut in the NOM SG, it is strikingly wrong. This means that at the very least W will have to add another PSC to his list, which specifies the well-formedness conditions for type D, NOM SG forms. He will also have to generalize his PSC (3) in Table 4 which specifies that DAT and ACC SG forms must have zero endings, to include NOM SG endings as well.

This discussion also raises two other issues. First, and this applies to realization rules as well, is the question of how many rules or PSCs there really are. The modified PSC (3) of Table 4, which limits the endings of three distinct feature bundles, is really three distinct rules whose conflation is simply a consequence of the formalization chosen, and in no way implies any functional unity -- as is obvious when we note that elsewhere in the language these three feature bundles often have three distinct realizations. Of course what's good for the goose is good for the gander, and we must admit that RR 48, which makes use of curly brackets, is really a conflation of two distinct rules as well. Counting PSCs and rules under the described definition of what counts as a distinct generalization, I find nine logically distinct PSCs plus three lexical 'features' (one per every root of paradigm types B, C and D) in W's account, and either eleven realization rules or nine realization rules, two lexically-specified inflectional forms (one per every root of paradigm types A and B), and one lexically specified declension class type (viz. type D -- type C is the ultimate default type under my analysis since it requires no special lexical information, either by way of particular forms or declension type indices). In other words, the accounts are very similar in terms of their theoretical 'cost'.

7.2 Empirical differences between the two approaches

There are two significant issues surrounding the empirical validity of the two approaches to inflectional description presented in this paper. A very striking difference in the two accounts is that one deals only with the endings which are marks of inflection in these paradigms, but the other account includes all of the relevant marks of inflection, both endings and vowel shifts. There is no question that the analysis which accounts for all the facts is better than the one which accounts for only some of the facts, despite W's statement that 'Allerdings nehmen diese PSB (=PSC in English) nur auf die Flexionsendungen und nicht auf

die Vokalwechselerscheinungen Bezug, die wir hier der Übersichtlichkeit halber außerhalb der Betrachtung lassen.' (W p. 631)[2]

Another point of contention between the theories has to do with their predictions about external evidence, specifically loanwords and language change. C (p. 2) states the evidence: 'Since the Old Icelandic period, there has been a continued drift of items from Type D to Type C, and from all the other types to Type A. In addition, Type A is regularly the home for loanwords which are adopted into Icelandic as monosyllabic Feminines, such as kók 'Coke' and dós 'dose'. This seems to pose a problem for the account offered in this paper, which takes Type C to be the least marked type of monosyllabic feminine noun. W's account, on the other hand, takes Type A nouns to be the least marked type of monosyllabic feminine.

The preponderance of strong, feminine nouns in Modern Icelandic are of Type A. Because Types C and D both show /-ur/ in the NOM PL as opposed to Type A with /-ir/ and Type B with /-ar/, the most general statement about the realization of the NOM PL must be that it is accomplished by suffixation of /-ur/ and i-umlaut unless otherwise specified. To state that the most general realization of NOM PL is accomplished by suffixation of /-ir/, which would seem to make the correct predictions about external evidence, requires us to introduce another realization rule. In other words statistics and logic lead us to different conclusions about the grammar of Modern Icelandic. It is certainly the case that the most common paradigm type in Modern Icelandic is Type A, economy of grammatical description notwithstanding, because it is a very large class, while B and especially C and D are much smaller. It is not the case, however, that the theoretically unmarked type must be statistically prominent.[3]

It is also somewhat comforting to notice that W's PSCs are not logically required to have Type A as the most basic noun type. Rather, he has simply 'rigged' his PSCs to get this result. This approach smacks of looking up the answer and working backwards through the solution, which is very second-rate methodology.

8. Conclusion

This paper reexamines strong, feminine, monosyllabic nouns in Modern Icelandic, beginning with a careful review of the data and amendment of previous analyses. The most striking finding in regard to the data in this paper is that previous analysts have overlooked some crucial details of inflectional realization: especially that there is a class of consonant-stem feminine nouns in Icelandic which are realized by suffixation of /-r/ and u-umlaut, not zero-suffixation as has been previously put forth; and second, that not only inflectional endings, but also vowel shifts, play an important role in inflectional realization, contrary to assertions otherwise in a recent analysis of these data.

This paper also compares two frameworks for understanding paradigm structures, namely W's PSCs and Z's realization rules. W's theory is found wanting in that it is inadequately incorporated into a larger theory of grammar. Furthermore, W's demonstration of his theory in describing Modern Icelandic gives a rather cavalier treatment of the facts, a methodologically, and therefore theoretically significant flaw. Z's realization rules, on the other hand, are fitted into a modular theory of grammar, which makes universal predictions about the organization of natural language grammars and rule interactions within those grammars. Furthermore, Z's framework makes place for the full range of phenomena found in inflectional morphology, namely nonconcatenative processes such as umlaut, as well as more agglutinative morphological processes.

Notes

*This paper was written in a seminar on inflectional morphology given by Arnold Zwicky, spring quarter 1988. Thanks go to Arnold Zwicky and the other participants in the seminar for their discussion and suggestions.

1. I render this quotation in English here for the reader: 'A vowel must either follow or precede an *r*. Where this was not the case in Old Icelandic, a *u* was later inserted before the *r* (young u).'

2. Again a translation for the reader: 'To be sure, these PSCs refer only to inflectional endings and not to the appearance of vowel alternations, which we have here left out of consideration for the sake of clarity.'

3. W's analysis dosn't really 'explain' the borrowing facts anyway. Why does kók enter Mordern Icelandic as a feminine noun in the first place? W's PSCs are silent about this issue. It seems like a plausible explanation to me to say that loanwords, which are borrowed as feminine nouns, are treated analogously with the most statistically prominent paradigm type because it offers the most cognitively salient model for analogy.

References

Carstairs, Andrew. (1988). Paradigm structure conditions, paradigm economy and Icelandic nouns. Unpublished ms.

Kress, Bruno. (1963). Laut- und Formenlehre des Isländischen. Halle/Saale: Niemeyer Verlag.

Wurzel, Wolfgang U. (1987). Paradigmenstrukturbedingungen. CILT 48: Papers from the 7th International Conference on Historical Linguistics. (ed. by Anna Ramat, Onofrio Carruba, and Giuliano Bernini), 629-644. Amsterdam: J. Benjamins.

Zwicky, Arnold M. (1985). How to describe inflection. Berkeley Linguistics Society 11.372-386.